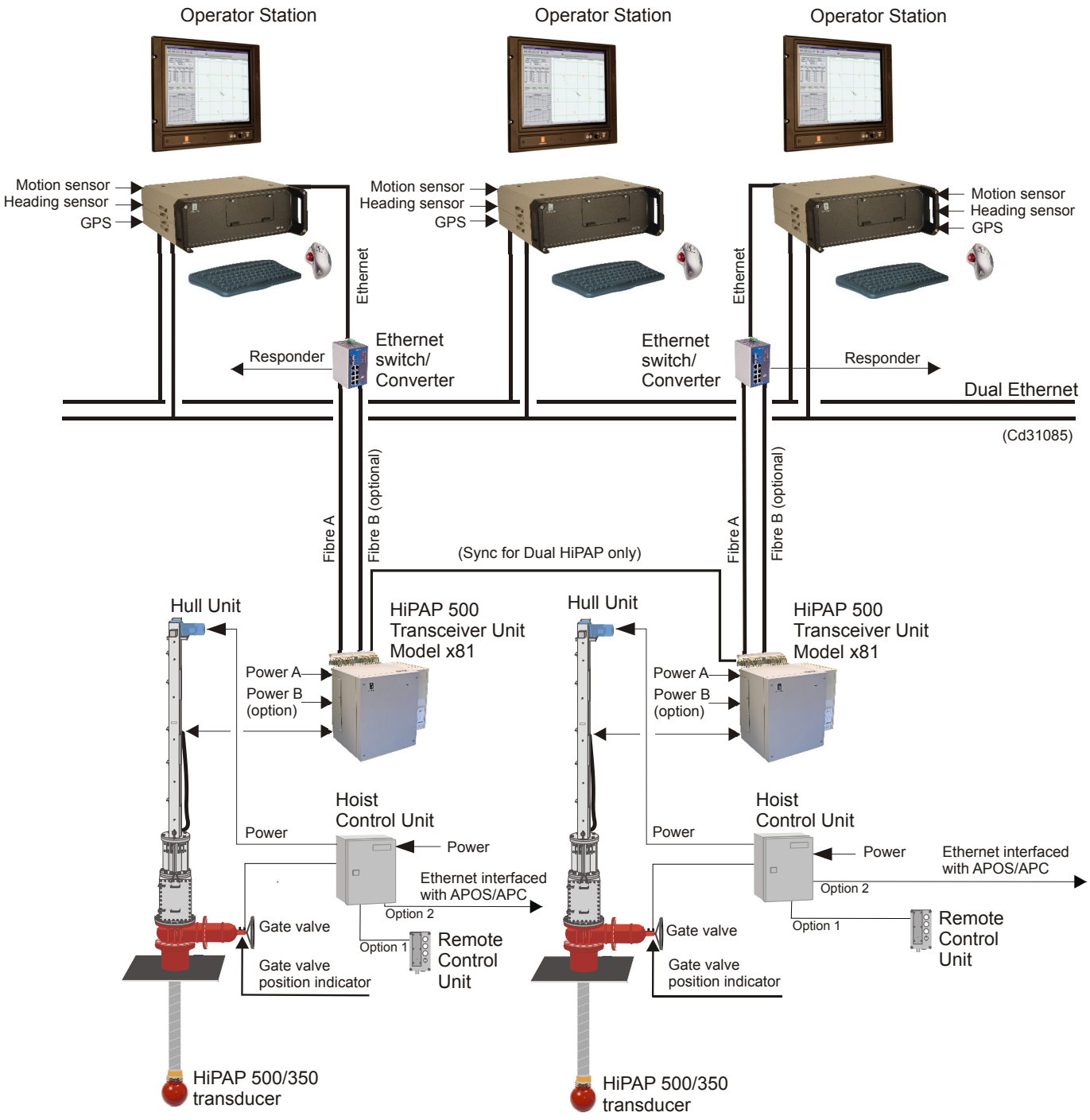
HiPAP® 501 Redundancy
Information letter

KONGSBERG

Case

A vessel is equipped with two HiPAP systems at two different physical locations on board.
Both systems are connected by dual Ethernet. Optional operator stations can be a part of the system.

System diagram



Redundancy at system level

All operator stations are able to operate both HiPAP systems. One operator station acts as the Primary Station and has the control of both systems. The operator(s) onboard can at any time take the control by pressing a button on the menu at one of the Secondary Stations.

If the current Primary Station falls out of operation, one of the other Secondary Stations will automatically take over the control and continue the operation. All operator stations are always synchronized in means of data needed for continuing the operation.
The system can also be configured as separate systems where one operator station only controls one specific HiPAP.

For both alternative configurations - Redundant or separate - there will be two independent position outputs to the Dynamic Positioning (DP) from the two HiPAP systems. If there is a third HiPAP systems onboard, there will be three independent position outputs to DP.

All operator stations are connected to external motion sensor(s), heading sensor(s) and GPS. Maximum three of each sensor with voting can be connected to the HiPAP computer(s).
The median value is computed every second. If the current selected sensor is outside the median plus the allowed deviation (configured in the HiPAP program), the next sensor is selected. A message will be displayed in the alarm view.

The operator stations are connected by dual network. From the transceiver unit to the Ethernet switch located by the operator station, two fibers are used, if one fails, the other will secure the operation. The power supply input to the transceiver unit is redundant by two separate power connectors.

Interface to motion and heading sensors can be redundant on each operator unit, up to three motion sensors and three heading sensors can be interfaced.

Redundancy in HiPAP Transceiver/Transducer

The HiPAP Transducer has 241 elements which each are separately wired to the transceiver unit. There are no electrical connections between the transducer elements in the transducer. If one element fails it will not have any impact on the other elements.

The transceiver units has eight equal TRX32 (transmitter/receiver boards), all together this is 241 separate transmitters and receivers.

If an element and/or transmitter channel fails it will have negligible impact on the performance of the actual interrogation of the transponders. In general there are 128 channels contributing to the interrogation of a transponder. If one element or transmitter channel fails the system will be reduced by less than 1/128 of its interrogation power. In other words the system is not dependent on one single transmitter.

If an element and/or receiver channel fails, its impact is dependent on the location of the failing element and the direction to the positioning transponder(s). In a normal drilling operation the transponders are located in a sector of +/- 15 degrees below the vessel. In this case the lower 128 elements on the sphere are contributing to the positioning accuracy. Elements on the “South-pole” have more impact on the accuracy than elements on the ”equator”.
In worst case, if one of the most important elements or receiver channels should fail, the position accuracy is insignificantly reduced.

Seabed transponders

Three or more transponders need to be deployed to ensure a redundant operation in SSBL mode, in case one fails there will be one as backup. For redundant LBL operation there should be five transponders in each network. LBL is operational on three transponders, four transponders provides a more reliable solution and five provides also backup for redundant operation.

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